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I perform event data analysis on the hostile events of North Korea affecting United states asset prices. I examine the effect of these events to US asset prices through local increment of political uncertainty and increase in patriotism. US have been under North Koreas nuclear threats and the North Korea have been estimated by experts to be able to finally fit the nuclear warhead in the missile which could hit the US coast. In recent year the subject has also been widely covered in international media. I don't find significant effects on U.S. asset prices during the events thus concluding that the threat posed by North Korea is not taken seriously by U.S. markets. This is aligned with former papers examining the effects in South Korea and North Korea concluding that the threat is not realistic. (Kim and Roland 2014)

Keywords North Korea threat, US Asset prices, stock prices, event study

North Korea threat not recorded through US asset prices: Evidence from events in the 21st century

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Bachelor's Thesis

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Abstract

I perform event data analysis on the hostile events of North Korea affecting United states asset prices. I examine the effect of these events to US asset prices through local increment of political uncertainty and increase in patriotism. US have been under North Koreas nuclear threats and the North Korea have been estimated by experts to be able to finally fit the nuclear warhead in the missile which could hit the US coast. In recent year the subject has also been widely covered in international media. I don't find significant effects on U.S. asset prices during the events thus concluding that the threat posed by North Korea is not taken seriously by U.S. markets. This is aligned with former papers examining the effects in South Korea and North Korea concluding that the threat is not realistic. (Kim and Roland 2014)

Contents

1 Introduction

There are early papers recognising that North Korea nuclear situation poses a serious security risk in the North-East Asia region (Hughes, 1996). Former papers have also been examining the credibility of the threat posed by North Korea nuclear missile program. Harrison (2000) questioned the credibility of the threat. He pointed clearly that it's hard to evaluate whether the North Korea would be able to launch a missile capable of carrying a nuclear payload and to be able to hit the United States mainland.

The discussion has been around the key factor whether the threats of North Korea are credible or not. In recent papers the credibility of North Korean Nuclear threats has widely been rejected. (Kim & Roland, 2014). Or at least made clear that the nuclear tests do not have catastrophic impact on south east Asia region (Noland, 2006). It has been pointed out that the even the experts have risen a concern and the news are sometimes discussing the possibility of nuclear war, the markets do not record this threat.

However, it needs to be remembered that even the early recognition of the threat posed by North Korea, the amount of papers examining the effect of these threats are still limited (Noland, 2006). And some of them do not use any econometric tools to further make justice to their conclusions. In some papers the shortcoming is that those use only market level studies This together with the fact that the tension between North Korea and United States have rose during the most recent years, makes the subject interesting to contribute. The rising tension between North Korea and the US is recognised by various reporters through worldwide news agencies like Prasad CNBC (August 2017), Lester NBC NEWS (September 2017) and former Defence Secretary of United States Panetta as Tillett reported. North Korea's rising intensity of nuclear and missile tests are realizing the more active development of their missile program with aim to develop missile capable of carrying nuclear warhead. These facts make it more interesting to examine the possible effects of the events affecting US asset prices. I assume that if the North Korea's capabilities are about to change the effects are becoming more visible in the markets.

In the paper I use event study methodology to test whether the North Korea's threats affect US asset prices through increased patriotism or political uncertainty. This is done through performing difference in differences analysis with daily stock returns. And using multiple missile launches, nuclear tests and threats through media to test whether these events have impact on US stocks in the sense of increased patriotism or local political uncertainty. I also perform analysis for the possible changes in volatility. This is done on the purposes of robustness check if the threats would be registered through increasing uncertainty in markets rather than negative daily returns. I have two kind of main treatment groups and corresponding comparison groups.

The first treatment group Headquarters looks the credibility of these threats by local approach. It has been built regarding expert's opinion that North Korea will be able to hit the US West Coast first and then later the East Coast. This is since The US West coast is closer to the North Korea. Thus, if North Korea can build a long range ballistic nuclear missile the West coast would be first within the reach of such a missile. I choose my first treatment group based on the headquarter location of the firm to test whether the market reaction to the threats of North Korea is registered only through group of firms in the West coast. One interesting thing to mention here is that many analysts and experts usually take a view on: When the North Korea will be able to hit the US East coast as there are the most crowded and well-known cities like Los Angeles, New York and Washington D.C.

The second treatment group of Patriotic names takes more severe view of the current situation examining whether the market reacts in the same way to these threats as they tend to during war time. The US investor's patriotism tends to increase during war times which becomes registered through stocks carrying patriotic name including US(A) or America(n) (Benos & Jochec, 2013). The most recent hostile behaviour of North Korea might be closest US have become war in their own land in many decades. Not to mention the huge media exposure which these events have gain in the recent years.

Based on my study the threats posed by North Korea are not registered as credible by the markets. There is no observed difference between firms in the West and East coast to support the claim about the threat being local. And the investors patriotism is not increased similarly as during the war time. This behaviour is against the expert's opinion claiming that the North Korean Nuclear threat is real and it would now be realised in the West coast. But aligned with the former studies of these events. There can be registered a small effect with a limited time window regarding the view that the West coast is more affected by the missile threats of North Korea. Still after using few control variables the effect gain significance only at 10% level. This is aligned with the opinion that the North Koreas nuclear threat is not taken seriously through markets.

The rest of the thesis proceeds as follows. In Section 2, is given a theoretical background and reasoning for my research question through former research of the political uncertainty affecting stock prices and volatility. There is also provided a reasoning about the patriotism affecting investors behaviour through security names and the threats of North Korea posing threat in South East Asia. Section 3 gives insight to the data and empirical methodology used. Section 4 presents the empirical results of the study. In the section 5 is performed various robustness checks to support the findings. Section 6 gives conclusion about the study and offers suggestions for further research to be contributed. References can be found from section 7 and Appendixes from section 8.

2 Theoretical background and Hypotheses

2.1 Political uncertainty affecting stock prices and volatility

Many papers during the recent decade have found that political uncertainty tend to affect asset prices and volatility. Pastor and Veronesi (2012, 2013) offered a model and empirical evidence towards the fact that political uncertainty affects to risk premia. They provided evidences that political uncertainty affects directly to the risk premia. Smales (2014) presented empirical evidence to support the claim of political uncertainty affecting in Australian markets during federal elections. He found evidences that higher uncertainty around the elections tends to lead higher market uncertainty. He did this through poling data and five Australian elections cycles. He found that the volatility for both equity and bond options increased in line with uncertainty around the election results. The political uncertainty has been examined in various context also in the U.S. and in the Asia regions. Goodell and Vähämaa (2013) examined the political uncertainty during the U.S. presidential elections through volatility. They suggested that there is a positive relationship between implied volatility and election probability of the winning presidential candidate.

As noted many former papers register political uncertainty through expected events for example government elections. (Goodell & Vähämaa, 2013), (Smales, 2014), (Li & Born, 2006), (Jens, 2017). Liu et. Al. (2017) examined the political uncertainty and asset prices in a case of unexpected event. They registered that Bo scandal in China tended to cause political uncertainty. They record a significant drop in stock prices, increasing volatility of stocks and decreasing cashflows during the event. In this event study I also use events which are unexpected, as one can't predict when North Korea is going to pose another threat against U.S. or conduct another missile test.

There are also various event studies recording political uncertainty through unexpected events. Chan and Wei (1996) recorded the political uncertainty effect using Hang Seng index in Hong Kong. Their main finding was that positive political news tend to produce positive stock returns and negative news causes negative returns. Jackson (2008) record negative movement on asset prices during 9/11 unpredictable terrorist attack in the US stock market but also highlighted the U.S. markets ability to fast recover from such a crisis. Chen and Siems (2003) found also similar results suggesting that U.S. capital markets recover from military attacks faster than other capital markets. Chesney et. al. (2011) examined multiple terrorist attach through various countries and found two thirds of the selected terrorist events causing significant negative impact on at least one of the observed stock markets. Perotti and Oijen (2001) investigate number of emerging markets under the political shocks. Their findings highlighted remarkable changes in excess returns when political risk increased or decreased. This is more evidence toward the findings that political uncertainty affects asset prices and the effect is even bigger among weaker economies (Pástor & Veronesi, Political uncertainty and risk premia, 2013).

2.2 Patriotism affecting investors behaviour through security names

Studies have shown that there are evidences in the financial markets that Investors patriotic feeling affects their investment decisions. Morse and Shive (2011) observed whether the patriotic feelings of investors do affect home bias. They registered that investors in more patriotic countries are more heavily investing in domestic equity. Further they concluded that patriotism is not only associated with home bias. It's affecting to investment decisions by its own.

Cooper et. al. (2001) found evidences towards that company which changed their name in the right time earned abnormal returns during five days around the announcement. They used the American listed companies during 1998 and 1999 and the companies which changed their name to include .net or .com. Their findings were a bit in a contradiction with the previous studies which have registered that name changes do not have significant effect on the performance of the company and the effects which can be seen as positive are often found driven by other factors (Bosch & Hirschey, 1989).

Benos and Jochec (2013) cross tested whether stock names do matter in a case of increased patriotism. They found evidences towards the fact that the stocks with patriotic sounding stock names tend to perform better during times when people's patriotic sentiments are tend to be high and market is unable to fix this mispricing. They used the periods which U.S. was in war as measurement for increasing patriotism. Still after controlling other factors by constructing control portfolio of stocks with similar industry, size and book to market ratio they are not able to reduce the possibility that industry effects drive the abnormal returns. But they didn't find clear factors driving their results other than the name bias. They also provide evidence that the stock price reaction wouldn't be immediate and would rather take as long as two years to cumulate.

2.3 North Korean posing threat in South East Asia

There are also few papers which take a closer look on the threats posed by North Korea. Kim and Roland (2014) did event study based on the data from 2000 to 2008 on the effects of North Korean threats to South Korean financial markets. They argued that South Korea would be first to capture the effect of rising military tension from North Korea, because it's located on the border of North Korea. They didn't find significant effect for the events which they argued to affect the tension between the North and South Korea. Thus, they concluded that the threats of North Korea are not realistic. They based their argument on that the markets often contain better information than the experts' opinions or any news agencies.

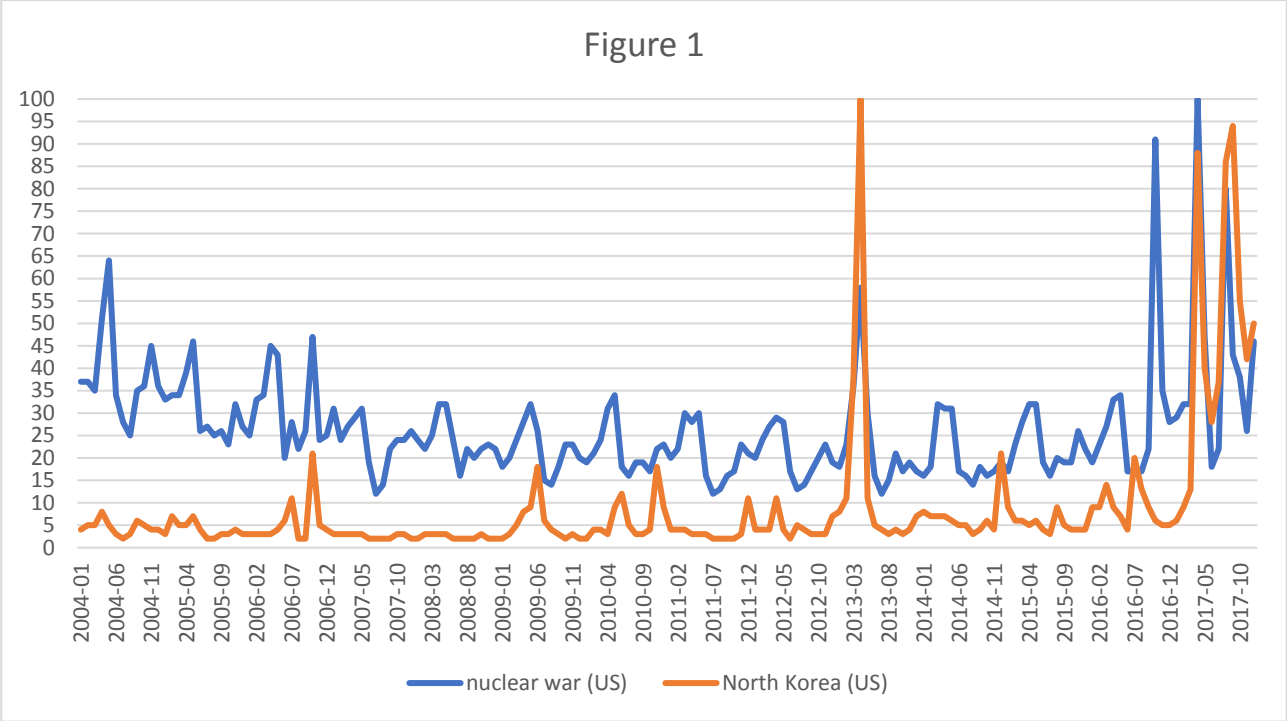
Noland (2006) did a scenario analysis on North Korean threats affecting South East Asian countries. He argued that the North Korean nuclear test would have negative but non-catastrophic economic impact on the region. Noland argued that South Korea and Japan would be influenced through capital flight and China would be affected mainly through political tension with United States, Japan and The EU. This is because the previous mentioned entities would probably have a strong reaction towards North Korea developing their nuclear

capabilities. Noland concluded that the importance to determine the provocative behaviour of North Korea would be crucial since the events would need cooperation to further avoid large capital spill overs.

Dibooglu and Cevik (2016) paid more attention to South Korean and Japan financial markets. They investigated the link between North Korean Threat Index (NKTI) build by NK news, arguing that it would be proper measure for the threatening level of North Korea behaviour, because the government heavily controls the nations' media. They stated that the opinion of news needs to reflect the governments public opinions. They found a causal link between the NKTI, stock returns and exchange rates but didn't find it between NKTI and overnight interest rates. Their main conclusion was apart from previous studies. Being first to record significant effect to South Korean and Japan security market stability due to North Korea hostile behaviour.

None of these previous studies have examined the North Korean hostile behaviour effects on US asset prices. In recent years the US and North Korea have been posting hard statements against one another in the media. North Korea have also recently performed missile test and test firings with increasing phase, making it totally 16 this year. The previous record in amount of missile testlaunches was from 2016 when North Korea fired five missiles. As seen in the **Figure 1** Google trend shows three major and two minor peaks from 1/2004 to 12/2017 for word Nuclear War in the US. Four out of five of these peaks have been emerged after the Kim and Roland (2014) study window and thus would indicate that maybe the US have become more involved in the uncertainty during the most recent years which has already become reality in the Asia like Dibooglu and Cevik (2016) recorded. The word North Korea has three clear peaks which all are after the 2008 end of the Kim and Roland (2014) study period giving also support to the claims that at least the threats of North Korea have started to gain more interest among American people due to the most recent events.

Figure 1 visualises the google trend for word nuclear war and North Korea in the United States from 1/2004 to 10/2017. The numbers are illustrating the relative popularity of the search over the selected period. The value of the scale 100 is the area where the term was most 0 is the area where searches were less than 1% of the largest share. From the Figure can easily be pointed out the increasing intensity of searches for the following words under two most recent years compared to the prior.



2.4 Setting up hypotheses

Assuming United States stock market are efficient in the semi-strong form, all the time any piece of publicly available information should be reflected in the stock prices. (Chan;Gup;& Pan, 1997), (Arshanapalli & Doukas, 1993) As noted before there are number of papers examining the effects of political uncertainty affecting asset prices and volatility. I set up to test to examine whether Korean threats increases political uncertainty in the United States which can be recorded through stock market. Stock market is a good metric as it's not biased due to some individual expert's opinions. It rather reflects the markets opinion regarding the reality of the threat. Same time align with the former studies I state that the capabilities of North Korea are under a big question mark. For this reason, I argue that the decrease in daily returns can be recorded through firms in the West coast rather than in the whole U.S.. For this reason, firms in the East Coast are not affected due to the reason that North Korea is not seen to be able to hit the East coast yet with a missile carrying nuclear warhead. My Hypothesis one is:

H1(Political uncertainty): The effect of North Korean hostile events causes asset prices to fall among firms in the West coast.

My second hypothesis is combining the patriotism and stock names. I argue that the patriotic feeling of Americans is increased during hostile events of North Korea. I study whether the increased feeling of

patriotism is captured by investing in securities which carry patriotic sounding name. This is similar kind of study which Benos and Jochec (2013) did regarding the war periods in U.S' history. I want to apply the following idea and methodology here as the hostile activities and straight threats posed by North Korea might be the closest U.S have been war in their own land for decades. My second hypothesis aim to capture this increase in patriotism:

H2(Patriotic): The North Korean hostile behaviour increases Americans patriotic feeling and it's captured by investing more to firms carrying patriotic names on their stocks.

3 Data and Methodology

3.1 Initial Data

My initial data consist of two main databases provided by Wharton Research Data Services (WRDS, 2017). I use the CRSP for the daily stock data including: company names, North American Industry Classification System-code (NAICS), number of shares outstanding, price and the daily stock returns. I use CRSP/Compustat merged database provided by WRDS for quarterly reported data. This database provides me data such as: Company total assets, Company total liabilities, calendar quarter for the data, headquarter location (Headquarters' state) and Country code for the headquarter and it can be easily merged with the corresponding data with CRSP database. The daily data is matched with the most prior reported quarter data. For example, observation date 16.6.2017 the corresponding quarter is 1/2017 as it's the most recent quarter data already available at the time.

The CRSP U.S. Stock database consists information on primary listings for equity securities for the NYSE, NYSE MKT, NASDAQ, and Arca exchanges. I filter firms based on two factors. The first condition is that the firms share code is equal to 10 or 11. It means that it needs to be primary listed equity security. This is due to the reason I want to observe US firms and not include cross listed companies, ADRs or Reits as those might be more driven by another factors than the events. I also filter firms based on the condition that those need to represent non-financial firms. This is done by excluding all the firms which carry NAICS sector-code (two first digit of NAICS-code) 52. The following group equals Finance and Insurance companies in the NAICS-code system.

I acknowledge that there might be excluded some insurance companies which are not financials but the exclusion is made due to the clarity of work as one cannot easily state whether these insurance firm's business is not including major part of financial firm's nature. To be noted here, there is only one subsector which would be considered to add in based on including these insurance companies which is 524 Insurance

carriers and related activities. After this said I argue it doesn't change results drastically by adding this group of firms to the sample so for the clarity and consistency of the work the complete sector of 52 is excluded. Companies registered NAICS sector code 52 in the Compustat dataset are also excluded. In this way If the company is registered to sector 52 in either of the databases, it's dropped from the initial data.

3.2 List of events

I set my study period from January 2006 to September 2017. The beginning of data is chosen by the fact that there was long period after Bush's speech "Axis of Evil" (Wikipedia Axis of evil) after the North Korea conducted again missile test in July 2006. The end of data is chosen on the basis that it's the most prior data currently available in the WRDS database. I use multiple sources to collect and confirm the dates and events to use in my study. The main sources used to collect the events were Wikipedia (Wikipedia North Korea Missile tests, 2017), CNBC (CNBC North Korea, 2017), BBC (BBC North Korea profile timeline, 2017) NY-times (NY times, 2017), CNN (CNN North Korea News, 2017) and US Department of State press releases (U.S. Department of State, 2017). I cross check reported events from various sources because it's not enough if the event is only registered in one source. The events registered by U.S.' media and authorities are included with the focus on the events which were felt to be hostile against United States. This limitation is done, because United States is not the only country which has been target of the threats and hostile words of North Korea. Every single news date which were related to news of North Korea are not included. Instead aimed to focus on days which were peaks in the Google trend seen in Figure 1. This makes sense as these events might cause more effect on the market because those captured audience attentions. This results in 37 events during 35 individual event dates. The original event dates, date used as event date, very brief description of the event and event type by my classification can be seen in **Appendix A.**

Kim and Ronland (2014) picked their event data from South Korean authority's official documents. I don't use those simply due to the reason I don't have easy access to that kind of data. I include three types of events in my sample: Test firing of missiles (24 events), Nuclear tests (4 events) and the most hostile word changing through public media (8 events) between North Korean president and the president of the United States. The tweets by U.S.' president or the North Korean president are not included. This is done due to the reason that it feels that the presidents can tweet almost anything without words to action.

The used event period is five days before the event and five days after the event. I include the event day to the five days after the period. In this way there is no "day zero" in the event windows and the event day is the day number 1 if you think the whole event window as [-5 +5]. In the robustness check section is also provided a test for event windows [-3 +3], [-10 +10] and [-20 +20] days. Naturally only the days which exchanges were open in U.S. are included, excluding weekends and holidays. In the cases where the event

was recorded during national holiday or weekend, the next closest banking day is used as the final event date, because that's the time when the events possible effect can be recorded in the markets.

In the cases where two or more event periods are overlapping with one to another the following process is applied: The days before and after the first event are choose normally and if there are days before the next event I take those days as prior event days. If the event is in another events post period (= [1 5]) the count of the post event days starts over from there. This results in a situation that the end of observations for the event window is always the observed number of post event days from the last event in the overlapping group of events. At the same time all the no effect days between the event dates become correctly chosen.

Later chapters explain the method of choosing the control groups and treatment groups. In this context concept matching day is used. Matching day is the most prior day before the entire event window. With a five-day event period ([-5 5]) it is the sixth day before the event (day number -6). And in case of many events during the same event window the group of stocks are matched prior to the first event. I do recognise that in cases there are multiple events overlapping the event window becomes longer and thus the matching day gets further in the future. I argue that in a case of using 10 business days this is not such big problem as the longest period between the event and the matching day is about a month. And as multiple matching firms are used the possible outliers effect (firms performing exceptionally well during this month and becomes to differ) becomes diluted and thus not driving the results.

3.3 Empirical methodology: Difference in differences analysis through OLS-regression

The difference in differences (DiD) approach's basic idea is that there are two groups: treatment group and control group. And the aim is to study the different reaction of these groups against the "treatment". The goal is to observe similar kind of behaviour among these groups prior to the event and different kind of behaviour in the post window of the event. The different behaviour among the groups then becomes visible by comparing the differences prior to the event and after the recorded event. I apply DiD-analysis in OLS regression to observe the effect of the North Korean events in United States through differences in daily stock returns between the treatment and comparison groups.

In the regression is included returns as observable variable and three explanatory variables together with three control variables. The explanatory variables are Treatment (whether the stock is in my treatment group), Post (whether the day is in the predicted effect window) and Treatment*Post (whether the observation is predicted to be affected). The control variables include two fixed effects estimates and natural logarithm of one day lagged firm size as independent control variable. I run Ordinary Least Square (OLS) regression using the described variables. The general main point of interest is the treat*post variables coefficient and of course its standard error as well as the t-statistic and p-values. This is since it's the variable which captures the combined effect of the stock being under treatment (belonging to treatment group under

used post event period). In other words it captures the observed difference in differences between the treatment and control group. To add robustness and for the reasons described in the following two chapter I also include firm fixed effect and date fixed effect. The final model for the regression becomes:

$$y \sim \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3 + \beta_4 * x_4 + \beta_n * F_n + \beta_r * D_r + \varepsilon$$

Where F_n = Estimated firm fixed effects
D_r = Estimated daily fixed effects
X_4 = natural logarithm of the firm size lagged by one day
$\beta_n\, \beta_r \beta_4$ = corresponding coefficients estimates
Here fixed effects estimates have clustered standard errors which allow for intragroup correlation. This is the robust way as we want to allow variation on observations among firms and dates naturally when observing the daily returns of the firms.

I use the option to allow intragroup correlation inside my firm fixed and day fixed effects, so that my standard errors would thus become more correctly calculated and results more robust. In other words, the observation between different groups (days or firms) are independent but not necessarily inside the groups.

Difference in Difference analysis became known in the economic world since Card and Krueger (1995) performed study on the effect of minimum wage in New Jersey using the DiD-method. After this the method become increasingly popular (Bertrand et. al. 2004). Slaughter (2001) used DID analysis to contribute robustness checks to the previous studies about liberalization and per capita income convergence resulting in a contradiction with the former studies suggesting that huge part of previous studies lack of robustness. In the following two chapters I explain my method of choosing treatment and comparison group for each of the Hypotheses.

3.4 Choosing treatment and comparison group for Hypothesis 1

For the Headquarter hypothesis (H1) companies which register their headquarters' country something else than US are excluded. This is done due to the natural reason that those headquarters can't locate on either East or West coast of United states. The treatment group is selected from my initial data by the requirement that the firm's reported headquarter should be located on the West coast on the matching day. My initial treatment group is all listed firms with the headquarter in the West coast. Appendix B reports the states classified as West Coast.

The control group is built with aim to choose five comparable firms against every firm in my treatment group on the matching day. The firms should be as similar as possible except the headquarter location (observed difference). In this way the aim is to minimize the other effects for example industry specific effects or size effects. The other location and date specific effects like hurricanes on another coast should become diluted by the multiple events used in the study. It would be highly unlikely that there would be coast specific effects during most of my event windows to drive the results.

Four conditions are used 1) size, 2) book to market, 3) NAICS-sector code and 4) Location of the Headquarter to define the group where the control group is finally picked with the 5) distance variable. Next is a brief description of each of the variables defined:

1) Firm's size is simply calculated as the Shares outstanding times absolute value of price observation on matching day. As sometimes the price observation is negative due to the reason that If the closing price is not available on a given trading day, the number in the price field has a negative sign to indicate that it is a bid/ask average and not an actual closing price.

$$Size = Shares\ outstanding * ABS(price)$$

2) Book to market is calculated simply by

$$Book\ to\ Market = \frac{Bookvalue}{Size}, \qquad \text{where } Bookvalue = Assets\ total - Liabilities\ total$$

Assets and Liabilities total are collected from the quarterly reported data and merged with corresponding daily data as previously described in the "3.1 Initial data"-chapter.

3) The NAICS-sector code is the two first digit of the NAICS code. Simply if the code is 111339 the sector code is 11 equal to Agriculture, Forestry, Fishing and Hunting.

4) Headquarter location for the firm in the comparison group needs to be in the East coast. The states recognised belonging to East coast are listed in Appendix B.

After calculating these variables, the firms in the control group needs to have same NAICS sector code, +/- 40% book value(BV) and +/- 40% size to be matching candidate for the corresponding firm in the treatment group. The purpose is to ensure that both groups of stocks are as similar as possible despite the observed difference, in this case the Headquarter location effect.

Then the following formula is applied to calculate the distance variable:

5) the distance variable for each of the matching candidates:

$$Distance = \left(\frac{treated\ firms\ size - candidates\ size}{treatedfirms\ size}\right)^2 + \left(\frac{treated\ firms\ BV - candidates\ BV}{treatedfirms\ BV}\right)^2$$

After calculating the distance variable, next step is to define the rank variable inside every group of possible matching candidates with increasing values (the stock with the smallest distance inside its group gains rank 1 etc.). Then all the firms which have rank five or under are chosen to control group. The treated firms with no matches found are dropped from the sample. Finally all the treated group firms which have later changed

their Headquarter location between West and East coast and thus become selected in both of the groups in different times are excluded from the control group. In the **Table 1** is the brief descriptive statistic of treatment and comparison group pointing describing their similarity and key statistics.

Table 1 describes the key statistics of the chosen Control and Treatment group on the matching days. The size and book to market (BM) is calculated as simple averages from the observations on the matching days. Number of firms is the number of unique firms in the sample. Average distance is calculated on matching day is among the chosen control firms.

	Headquarters 5 days	
variable	Treatment	Control
size	3941430	2278608
BM	0.0005232752	0.0004925864
number of unique firms	1165	1846
Average distance	0.075121	

The number of unique firms are quite close to each other's even with the aim to select five control firm against every treated firm. This is since the firms in the East coast are only accepted, so the number of possible matching firms becomes limited. I do note that the average size of the treatment group is well of the size of the control group. This is since there is found greater number of matches for the small firms in general. This then drives the average size of my control group down. For this reason, I include several control variables like logarithmic lagged size and firm fixed effect in my regression to avoid the bias possible caused by the size of the firms.

3.5 Choosing treatment and comparison group for Hypothesis 2

For the patriotic names Hypothesis, Assumption is made that when the aim is to capture the increasing patriotism trough stock names, it doesn't matter whether the firms headquarter is in the U.S or not. This is because investors with irrationality of investing shares based on their names might not be so worried about which country the headquarter is located. This is also shown in the robustness check for patriotic names hypothesis by performing the analysis and including only firms with headquarters in the United States.

The treatment group for the Hypothesis 2 is picked with similar kind of method as Benos and Jochec (2013). The company's name is classified patriotic if it contains the word "America(n)" or "US(A)" on the event date. Also "U(.)S(.)" combinations are accepted because I found with manual checking that in many cases if not all it refers to United States in the stock name. I don't take further opinion whether the name is patriotic or not. In the paper they excluded few firms based on that the word America did refer to some specific area inside the United States or word US referred to "us". The following firms are accepted as well stating that irrational investor might not care in which is the final referring purpose of America or US in the stock's name. This kind

of cases becomes extremely rare and in this way effect of those companies becomes diluted. After picking the treatment group similar kind of methods are used as in Hypothesis 1 to pick the control group with one exception. The headquarter condition (number 4) is not used. Size, book value, book to market and distance variables calculated and similar limitation used as with Hypothesis 1 to form group of candidates for the control group. The distance variable is calculated and the stocks which received rank equal or under five are picked to the final control group.

After picking up all the stocks based on their rank the firms with no matches are excluded. If firm arises in both groups during the whole event period, it's deleted from the control group. The key statistic of firms in the treatment group and control group on the matching day are summarized in the **Table 2.**

Table 2 describes the key statistics of the chosen Control and Treatment group on the matching days. The size and book to market (BM) is calculated as simple averages from the observations on the matching days. Number of firms is the number of unique firms in the sample. Number of observations is the number of observations on the matching days.

	Patriotic 5 days	
variable	Treatment	Control
size	2677326	2114009
BM	0.006570907	0.0005963055
number of unique firms	118	1313
Average distance	0.04213796	

The average size of the treatment group is well of the size of the control group. This is since there is found greater number of matches for the small firms in general. This then drives the average size of my control group down. For this reason, several control variables are included like logarithmic lagged size and firm fixed effect in my regression to avoid the bias possible caused by the size of the firms. Now there are plenty of more unique control firms than treatment firms. This is good since the matching is done multiple times there emerges big rotation on the control firms side. This means that possible one firms effects trough the sample becomes smaller.

4 Main findings

The next step is to regress model specified in the "3.Data and Methodology"-section. To refresh the memory, the model which coefficients becomes estimated is:

$$y \sim \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3 + \beta_4 * x_4 + \beta_n * F_n + \beta_r * D_r + \varepsilon$$

Where y = daily return factor
x_1 = treat dummy
x_2 = post dummy
x_3 = treat*post dummy
X_4 = natural logarithm of the firm size lagged by one day
F_n = Firm fixed effects specified with treatment
D_r = Day fixed effects
β_1 to β_4 and β_n β_r = corresponding coefficients estimates
ε = error term

The estimated coefficients and corresponding standard errors together with T-statistics for Hypothesis 1 can be seen in **table 3.** One could wonder why the coefficient and corresponding statistics for the post variable are not reported. The explanation is simple: the daily fixed effect is used the post variable becomes omitted. This is through the fact that naturally when including every day's individual dummy variable in the regression it captures all the movement of the post variable (which is dummy variable for the days after the event gaining value 1 and otherwise being 0) and thus becomes omitted. The treat variable becomes omitted as well for the similar reasons when adding the firm fixed effect to the regression. For this reason, the post or the treat variable statistics are not reported. There is no difference between results by running the regression without or with the post and the treat variable. The results naturally stay the same in either of the cases as the variables truly are omitted.

Table 3 describes the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for the Hypothesis 1 Headquarters. In the table Treatpost(TP) is the dummy variable indicating to the observed treatment affection. Logsize is the control variable which is natural logarithm from one day lagged firm size. Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. In the tables lower section is reported usage of Firm and date fixed effects, Models R-square and adjusted R-square together with number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	Coef.	Std. Err.	T	p>T
treatpost(TP)	-0.0001309	0.0002869	-0.46	0.648
logsize	-0.0025279	0.0003272	-7.72***	0.000***
Firmfixed effect	yes			
Date fixed effect	yes			
R-squared	0.0851			
Adj R-squared	0.0801			
Number of observations	612 039			

From the results in table 3 can clearly be noted that there is no significant observed through the treatpost(TP) variable. TP variable is the main interest here as described earlier. It combines the dummies of belonging in to the treatment group and being under the effects time window just after North Koreas posed hostile behaviour. It can be clearly pointed out that the T*E variable is gaining quite small coefficient of -.0001238 and even though it's in the right direction (minus sigh) to give support to my Hypothesis 1 it's gaining p-value of 0.66 which is even far from significant even at 20% or even 40% level. Thus, the results clearly pointing the direction to reject the Hypothesis 1. There is still a bit space before jumping to the most final conclusions and performing various other analysis in the following robustness check section. In the section there are performed various other analysis for example with different time periods and alternative volatility analysis to make the results more robust and to be sure that there is no difference between East and West coast under hostile behaviour of North Korea.

The same regression model for Hypothesis 2 Patriotic is used but with different group of stocks. In the table 4 is reported the key statistics for the Hypothesis 2 which aims to discover whether there is increase in the patriotism under the periods of North Koreas hostile behaviour.

Table 4 describes the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for the Hypothesis 2 Patriotic. In the table Treatpost(TP) is the dummy variable indicating the observed treatment affection.Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. Logsize is the control variable which is natural logarithm from one day lagged firm size. In the tables lower section is reported usage of Firm and date fixed effects, Models R-square and adjusted R-square together with number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	Coef.	Std. Err.	T	p>T
treatpost(TP)	-0.00004	0.000499	-0.08	0.938
logsize	-0.00498	0.000789	-6.32***	0.000***
Firmfixed effect	yes			
Date fixed effect	yes			
R-squared	0.1008			
Adj R-squared	0.0709			
Number of observations	52 693			

The treatpost variable is far from implied by the Hypothesis two. It's not significant at any level, small even relatively speaking and after all this in to the wrong direction to support Hypothesis 2. Once again, the R-square and adjusted R-square are quite small but it's not the most concerning thing when it comes to results to support the Hypothesis 2. By these results it implies in to the direction to reject also Hypothesis 2. Even the most optimistic sight would reject this hypothesis from further investigation in the following section is still performed various robustness checks to add robustness. The next section contains various robustness checks for both Hypotheses 1 and 2.

5 Robustness check

5.1 Different event windows

What if the effect of these threats is realised through longer period or it's only lasting few days? To show that the results are robust under these assumptions I provide my results also with additional event windows. In this section the regression also performed with [-3 +3], [-10 +10] and [-20 +20] event windows. The treatment group stays the same for each of the Hypothesis 1 and 2. The corresponding control group is found similarly in each of the cases as with the five-day time window. The matching and picking the control group is done always on the most prior day before the event window. For example, if the event window is [-3 +3] the matching in this case is done on day -4 etc. I do recognise that when the observed event window becomes longer the matching tends to get rarer and the observed prior event days becomes less in numbers. Though the dates are not included twice to avoid overstatement or understatement of the effect. The process goes

as described in the method section including each day only once in the final sample. The results of OLS-regression for different time periods for Hypothesis 1 and 2 in **table 5 and 6.**

Table 5 reports the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for the Hypothesis 1 with additional event windows noted in the headers. In the table Treatpost(TP) is the dummy variable indicating the observed treatment affection. Logsize is the control variable which is natural logarithm from one day lagged firm size. Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. In the tables lower section is reported usage of Firm and date fixed effects, Models R-square and adjusted R-square together with number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	West vs. East coast +/-3 days			West vs. East coast +/-10 days			West vs. East coast +/-20 days		
	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)
treateffect	-0.00065	0.0004	-1.80 (0.073*)	-0.00016	0.00024	-0.67 (0.504)	-0.00014	0.00021	-0.68 (0.496)
logs	-0.00290	0.00037	-7.77 (0.00***)	-0.00239	0.00024	-9.69 (0.00***)	-0.00250	0.00021	-11.86 (0.00***)
Firm fixed effect	yes			yes			yes		
Date fixed effect	yes			yes			yes		
R-squared	0.0915			0.0801			175,678		
Adj R-squared	0.0845			0.0769			0.0815		
Number of obs	411 698			961 137			1 494 433		

The results support earlier conclusions that there are no significant effect among firms in the West coast compared to the east coast when North Korea conducts nuclear test or test launches their missiles. One coefficient Headquarter +/- 3 days event window gains very small coefficient -0.00065 and is significant at 10% level. The effect was without control variables significant even at 5% level, but logsize and fixed effects captured the effect even to be significant only at 10% level. This raises attention about the fact whether there is effect, but it fades away quickly. For this reason, I tried the regression with one more additional event window of +/-2 days. The effects significance of the coefficient disappeared for that reason not reported in the thesis. The final decision is to reject Hypothesis 1 and thus claim that there is no effect among firms in the West during the hostile behaviour of North Korea.

The table 6 continues the story. There are no significant coefficients recorded for the observed treatpost coefficient even at 10% level. Still one interesting thing here is that the hypothesis with the widest event window gains the most significant coefficient of treatpost but still with the wrong sign. And when increasing

the event window it becomes almost significant at 10% level. I also investigated whether adding the condition that the headquarter of the stock classified as patriotic needs to be in the United States. The results of the regression are reported in the Appendix C. Generally, those don't report anything deviant when comparing to the results below. Coefficients are small and more insignificant than the ones below supporting my statement of the fact that irrational investors might not care about headquarter location of the patriotic sounding firm.

After these conclusions I decide to reject my Hypothesis 2 also and thus conclude that there is no significant reaction towards increase in patriotism in the United States after North Koreas hostile behaviour or at least it's not recorded through investing in patriotic stocks inside short period.

Benos and Jochec (2013) found in their study that patriotic stocks tend to react slowly, and it's realized when observing with long period of cumulation. In this case I leave that for later studies. It would be interesting investigate whether the trend of increasing the event window makes the treatpost coefficient significant even at 5% level. Next is the very final robustness check section before rejecting my hypotheses finally. In the following sub-section, I perform rolling volatility analysis for both of my Hypotheses. The method described in the very most beginning of the chapter and results in the end of the chapter.

Table 6 reports the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for Hypothesis 1 with additional event windows noted in the headers. In the table Treatpost(TP) is the dummy variable indicating the observed treatment affection. Logsize is the control variable which is natural logarithm from one day lagged firm size. Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. In the tables lower section is reported usage of Firm and date fixed effects, Models R-square and adjusted R-square together with number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	Patriotic +/-3 days			Patriotic +/-10 days			Patriotic +/-20 days		
	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)
Treatpost	-0.00038	0.00060	-0.06 (0.949)	-0.00051	0.00039	-1.3 (0.193)	-0.00058	0.000374	-1.56 (0.119)
logsize	-0.00492	0.00093	-5.32 (0.000***)	-0.05147	0.00058	-8.77 (0.00***)	-0.00586	0.00083	-6.83 (0.00***)
Firm fixed effect	yes			yes			yes		
Date fixed effect	yes			yes			yes		
R-squared	0.1099			0.0980			0.0864		
Adj R-squared	0.0697			0.0807			0.0748		
Number of obs	46 297			112 448			175 467		

5.2 Volatility analysis

There is still a slight possibility that the effects of hostile events are recorded trough the up and down movement in the daily stock returns rather than universal decreasing trend. In this case the effects of political uncertainty would become recorded as increase in the volatility of daily returns. Many former papers have examined the increased volatility in the concept of political uncertainty. (Pastor and Veronesi 2012, 2013), (Smales, 2014) and (Goodell & Vähämaa, 2013). For this reason, I have built alternative Hypotheses to observe the possible changes in volatility after the events. My alternative hypothesis is for the Hypothesis 1:

H1b: The volatility is increased among firms in the West coast due to increased political uncertainty posed by North Korean hostile events.

The volatility analysis is performed also for the Hypothesis 2. The aim is to examine whether the effect of hostile behaviour is observed more strongly among the group of patriotic stocks than the control group. The volatility might be better measure than the daily stock returns, because it captures the possible "elevator movement" in the daily returns. The following alternative Hypothesis is set to examine the effect of volatility among the patriotic stocks:

H2b: The volatility increases among patriotic stocks because those are more affected by North Korean hostile events.

Volatility is observed through differences between my treatment and control group by using the difference in differences analysis. The method is very similar as in the case of observing daily stock returns. I count the daily volatility observation as 10 day lagged rolling volatility. The volatility in day T is the standard deviation of the daily return observations from T-9 to T. The treatment group and control group are the same as in the case of observing [-20 +20] daily returns and the volatility analysis is performed by using only this event window. I wanted to use only the [-20 20] event window, because when observing the volatility by rolling volatility it tends to change slowly. The method allows to observe 11 days before the event (prior event period) and 20 days after the event (post period) volatility observations. This is since the first observation of the event widow is day 10 observation. After calculating the volatility observations, the OLS-regression is run with the same model as before. The exception is that the volatility observations replace the daily return observations. Naturally the event window is dropped from 40 days to 31 days because the method of calculating volatility as mentioned earlier. The results of the regression for both Hypotheses 1 and 2can be seen in table 7.

Table 7 reports the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for Hypothesis 1 and 2 volatility analysis. Here treatpost(TP) is the dummy variable indicating observed treatment affection. Logsize is the control variable which is natural logarithm from one day lagged firm size. Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. Also, models R-square and adjusted R-square are reported together with Number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	West vs. East coast volatility (31days)			Patriotic volatility (31 days)		
	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)
treateffect	0.00046	0.00044	1.06 (0.291)	-0.00059	0.00056	-1.06 (0.291)
logs	-0.00405	0.00039	-10.35 (0.000***)	-0.00590	0.00116	-5.06 (0.000***)
Firm fixed effect	yes			yes		
Date fixed effect	yes			yes		
R-squared	0.2674			0.4040		
Adj R-squared	0.2654			0.3954		
Number of obs	1,280,913			149 254		

Even though the coefficient is in the right direction with the West vs. East scenario it doesn't gain enough significance to be credible. It's not significant even at 25% significance level. In the patriotic firms case the volatility coefficient is in the wrong direction implying decrease in daily volatility after the event compared to the control group. After these regressions I decide to reject my alternative Hypotheses 1b and 2b. This leaves me to conclude that there is no effect in the names of increase in volatility.

I recognise that it would be more ideal to record the daily volatility as inter daily volatility observations. It would be beneficial, because it would reflect the true behaviour of the stocks on the daily level. By this modification the matching day would become closer of the event day as well. I have not used the inter daily volatility observations because I don't have easy access in such a data and thus it would take excessive amount of time to get hands on such a data. Because of these factors I decided to leave it to the later studies.

6 Conclusions and discussion

The study contributes to observe the possible effect of North Korea hostile behaviour to the United States asset prices. This is done through two different kind of Hypotheses. The first aimed to capture the different behaviour of stocks between West and East coast claiming that the capabilities of North Korea to launch intercontinental missile makes the threat local. The other aimed to capture effect on asset prices through

increased patriotic feeling realised through investing more to patriotic stocks. Using similar kind of methods as some former research (Benos & Jochec, 2013).

Even with the increase phase of nuclear and missile test in the North Korea together with worldwide media coverage of the events there is no effect recorded on United States asset prices with the following classification used. After running multiple difference in differences regression with three control variables and clustered standard errors I end up rejecting both of my main Hypotheses. This leaves the results together with former studies stating that even if experts tend to highlight the threat posed by North Korea, the market at least in the United States is not yet taking that threat seriously (Kim & Roland, 2014) (Noland, 2006).

After performing various robustness checks there is still many opportunities for further investigation of these events. To perform better, I would suggest observing daily volatility instead of rolling volatility to capture the most hectic changes inside the corresponding days. Also using another classification for the treated group for example investigate whether the State ownership plays a role like former papers have investigated in a different context (Zhou, 2017) (Liu et.al (2017). The topic stays timely if North Korea and United States relationship stays cold.

In the broader scale now when the research around political uncertainties have been increasingly intense, it would be interesting to see some studies with very robust method focussing on the hostile behaviour of North Korea and those possible effect on Asia. Also update on this intense situation between United States and North Korea would be worthwhile observing through different markets even though I didn't now record the effects significant through stock markets.

7 References

Arshanapalli, B., & Doukas, J. (1993). International stock market linkages: Evidence from the pre- and post-October 1987 period. *Journal of Banking and Finance, 17*, 193-208. Retrieved 12 1, 2017

Benos, E., & Jochec, M. (2013). Patriotic name bias and stock returns. *Journal of Financial Markets, 16*, 550-570. doi:10.1016/j.finmar.2012.10.002

Bertrand, M., Duplo, E., & Mullainathan, S. (2004). How much should we trust differences in differences estimates? *The Quarterly Journal of Economics, 119*(1), 249-275. doi:10.1162/003355304772839588

Bosch, J.-C., & Hirschey, M. (1989). The Valuation Effects of Corporate Name changes. *Financial Management, 18*(4), 66-73. Retrieved 23 11, 2017, from http://www.jstor.org/stable/3665798

budget, E. o. (2017). *North American Industry Classification System.* Executive office of the president office of management and budget. Retrieved 10 23, 2017, from https://www.census.gov/eos/www/naics/

Card, D., & Kruieger, A. B. (1995). Minimum Wages and Employment: A Case study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review, 85*(2), 238. Retrieved 12 2, 2017, from http://web.a.ebscohost.com.libproxy.aalto.fi/ehost/detail/detail?vid=0&sid=b978e618-53cf-4f8e-9fc8-c362db6469f2%40sessionmgr4008&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=9507060130&db=bth

Chan, K. C., Gup, B. E., & Pan, M.-S. (1997). INTERNATIONAL STOCK MARKET EFFICIENCY AND INTEGRATION: A STUDY OF EIGHTEEN NATIONS. *Journal of Business Finance & Accounting, 24*(6). Retrieved 12 3, 2017

Chan, Y.-c., & Wei, J. K. (1996). Political risk and stock price volatility: The case of Hong Kong. *Pacific-Basin Finance Journal, 4*, 259-275. Retrieved 11 22, 2017

Chen, A. H., & Siems, T. F. (2004). The effects of terrorism on global capital markets. *European Journal of Political Economy, 20*, 349-366. doi:10.1016/j.ejpoleco.2003.12.005

Chesney, M., Reshetar, G., & Karaman, M. (2011). The impact of terrorism on financial markets: An empirical study. *Journal of Banking & Finance, 35*, 253-267. doi:10.1016/j.jbankfin.2010.07.026

Cooper, M. J., Dimitrov, O., & Rau, R. P. (2001). A Rose.com by Any Other Name. *The Journal of Finance, 56*(6), 2371-2388. Retrieved 11 23, 2017

Dibooglu, S., & Cevik, E. I. (2016). The effect of North Korean threats on financial markets in South Korea and Japan. *Journal of Asian Economics, 43*, 18-26. doi:10.1016/j.asieco.2016.03.002

Goodell, J. W., & Vähämaa, S. (2013). US presidential elections and implied volatility: The role of political uncertainty. *Journal of Banking & Finance, 37*, 1108-1117. doi:10.1016/j.jbankfin.2012.12.001

Harrison, S. S. (2000). The Missiles of North Korea How real a Threat? *World policy journal, 3*, 13-24. doi:http://www.jstor.org/stable/40209700

Hughes, C. W. (1996). The North Korean Nuclear Crisis and Japanese Security. *Survival, 38*, 79-103. doi:https://doi.org/10.1080/00396339608442847

Jackson, O. A. (2008). The Impact of the 9/11 Terrorist Attacks on the US Economy. *Working paper*. Retrieved 11 22, 2017

Jens, C. E. (2017). Political uncertainty and investment: Causal evidence from US gubernatorial elections. *Journal of financial economics, 124*(3), 563-579. doi:10.1016/j.jfineco.2016.01.034

Kim, B.-Y., & Roland, G. (2014). How credible is the North Korean threat? *Economics of Transition, 22*(3), 433-459. doi:10.1111/ecot.12044

Lester, H. (2017, September 26). Tension Escalates Between U.S. and North Korea. Retrieved from https://www.nbcnews.com/nightly-news/video/tension-escalates-between-u-s-and-north-korea-1055625283691

Li, J., & Born, J. A. (2006). Presidential election uncertainty and common stock returns in the United States. *The Journal of Financial Research, XXIX*(4), 609-622. doi:10.1111/j.1475-6803.2006.00197.x

Liu, L. X., Shu, H., & John Wei, K. (2017). The impacts of political uncertainty on asset prices: Evidence from the Bo scandal in China. *Journal of Financial Economics, 125*, 286-310. Retrieved 9 15, 2017

Morse, A., & Shive, S. (2011). Patriotism in your portfolio. *Journal of Financial Markets, 14*, 411-440. doi:10.1016/j.finmar.2010.10.006

Noland, M. (2006). The Economic Implications of a North Korean Nuclear Test. *Asia policy, 2*, 1-39. doi:10.1353/asp.2006.0014

Pástor, Ľ., & Veronesi, P. (2012). Uncertainty about Government Policy and Stock Prices. *The Journal of Finance, 67*(4), 1219-1264. Retrieved from http://www.jstor.org/stable/23261358

Pástor, Ľ., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics, 110*, 520-545. doi:10.1016/j.jfineco.2013.08.007

Perotti, E. C., & Oijen, P. v. (2001). Privatization, political risk and stock market development in emerging economies. *Journal of International Money and Finance, 20*, 43-69. Retrieved 11 22, 2017

Prasad, N. (2017, August 8). *CNBC: Stock Markets, Business News, Financials, Earnings*. Retrieved 10 25, 2017, from CNBC: https://www.cnbc.com/2017/08/08/reuters-america-precious-gold-up-on-rising-u-s-north-korea-tensions.html

Slaughter, M. J. (2001). Trade liberalization and per capita income convergence: a difference-in-differences analysis. *Journal of International Economics, 55*, 203-228.

Smales, L. A. (2014). Political uncertainty and financial market uncertainty in an Australian context. *Journal of International Financial Markets, Institutions & Money, 32*, 415-435. doi:10.1016/j.intfin.2014.07.002

Tillett, E. (2017). *Leon Panetta urges Trump to "lower the volume of rhetoric" on North Korea.* CBS NEWS. Retrieved 11 15, 2017, from https://www.cbsnews.com/news/leon-panetta-urges-trump-to-lower-the-volume-of-rhetoric-on-north-korea/

Wikipedia Axis of evil. (n.d.). Retrieved 12 11, 2017, from Wikipedia: https://en.wikipedia.org/wiki/Axis_of_evil

WRDS. (2017, 11 19). Wharton Researche Data Servicue. Retrieved from https://wrds-sol1.wharton.upenn.ed

Zhou, Z. (2017). Government ownership and exposure to political uncertainty: Evidence from China. *Journal ofBankingandFinance, 84*, 152-165. doi:10.1016/j.jbankfin.2017.08.001

8 Appendixes

Appendix A

Appendix A table Includes a list of hostile events by North Korea between 2006- September 2017. Table records the original calendar date of the event as well as the business day used as event day in the study. If the Original date is highlighted with different colour it means that there were google trend peak in the following day for word "**Nuclear war**" or "**North Korea**" in the United States. In the table is also included classification and brief description of the events which helps further to give clear picture of the event types used in the study.

Original date	Date used	Type (Media/Missile test/Nuclear test)	Brief Description
29.1.2002	NOT USED	Media	George W. Bush named North Korea as part of axis of evil and noted while the people are starving the country is developing arms of mass destruction
17.10.2002	NOT USED	Media	Us announces new intelligence information that North Korea had over the past years keep developing its nuclear program despite its compact to disarm those
5.7.2006	5.7.2006	Missile test	North Korea launched long range Taepodong 2 missile and short-range Scud North Korea made the firing public on July 6th
9.10.2006	9.10.2006	Missile test	North Korea conducted its first nuclear test which was announced 3.10.2006.
4.7.2009	6.7.2009	Missile test	North Korea launched seven short range missiles into the Sea of Japan. This was violation against United Nations Security Council Resolution 1874
25.9.2009	25.9.2009	Nuclear tests	North Korea conducted its second nuclear device detonation
12.2.2013	12.2.2013	Nuclear tests	North Korea media announced that North Korea have done its third nuclear test
4.4.2013	4.4.2013	Media	There was press release through US government site that North Korea launched another intermediate range ballistic missile
9.4.2013	9.4.2013	Media	North Korean media told foreign people to get safe in the border of North and South Korea in a case of conflict
11.4.2013	11.4.2013	Media	The news spread that American intelligence have confirmed that North Korea has learned how to fit nuclear warhead in a ballistic missile
18.5, 19.5, 20.5.2013	20.5.2013	Missile test	North Korea fired four short range missiles during the three days and launched short range projectiles.
30.6.2014	30.6.2014	Missile test	North Korea test fired Nodong missile and South Korean ministry representatives protested as there were not designated "no-sail-zone"
6.1.2016	6.1.2016	Nuclear tests	North Korea made its fourth nuclear test which was also noted in the US state government press release on the same day.

24.8.2016	24.8.2016	Missile test	North Korea claimed that it had launched Pukkusong-1 missile which would be able to hit the United States
5.9.2016	6.9.2016	Missile test / Media	It was stated that "The United States strongly condemns North Korea's launch of three ballistic missiles into the Sea of Japan" in the State government press release just after North Korea fires off three modified Scud missiles.
9.9.2016	9.9.2016	Nuclear tests	North Korea claimed that it had detonated nuclear war head. This was noted also in the United States government press release
15.10.2016	17.10.2016	Missile test	North Korea tested ballistic missile
19.10.2016	19.10.2016	Missile test	North Korea test launched a medium range missile
11.2.2017	13.2.2017	Missile test	North Korea test fired Pukguksong 2 missile in to the Sea of Japan
6.3.2017	6.3.2017	Missile test	North Korea test launched four ballistic missiles, and some of them flew even 1000km
4.4.2017	4.4.2017	Missile test	North Korea test fired a medium range ballistic missile which was also noted in United States government press release said "we have spoken enough no further comments"
15.4.2017	17.4.2017	Missile test	North Korea tested a land base missile which was unrecognised
28.4.2017	28.4.2017	Missile test	North Korea test launched missile which was believed to be a medium range missile
13.5.2017	15.5.2017	Missile test	North Korea test fired Hwasong-12 missile which travelled 30 min and 789km.
21.5.2017	22.5.2017	Missile test	North Korea test fired another Pukguksong 2 missile in to the Sea of Japan which travelled approximately 450km
29.5.2017	30.5.2017	Missile test	North Korea test fired short range ballistic missile which travelled 450km
8.6.2017	8.6.2017	Missile test	North Korea test fired several missiles into the Sea of Japan
23.6.2017	23.6.2017	Missile test	North Korea tested a new rocket engine that was believed to be closely linked in building intercontinental ballistic missile
4.7.2017	5.7.2017	Missile test	North Korea test fired its first Intercontinental ballistic missile (ICBM) which reached 2500km into space and landed 930km from its launch site.
25.7.2017	25.7.2017	Media	North Korea threated a nuclear strike on the United States if it attempts to remove Kim as leader according to Korean Central News Agency
28.7.2017	28.7.2017	Missile test	Just after the threat North Korea test launched another ICBM
8.8.2017	8.8.2017	Media	US president Donald Trump held well known speech against North Korea titled as "Fire and Fury"
9.8.2017	9.8.2017	Media	North Korean News agency said that North Korea is examining the operational plan to strike areas around US territory of Guam
26.8.2017	28.8.2017	Missile test	North Korea test fired three short range ballistic missiles
29.8.2017	29.8.2017	Missile test	North Korea launched a ballistic missile over Northern Japan
3.9.2017	5.9.2017	Missile test	North Korea conducted its sixth nuclear test which was recorded through earthquake seismologists.
15.9.2017	15.9.2017	Missile test	North Korea launched a ballistic missile which travelled 770km in height and flew 3700km over Hokkaido.

Appendix B includes tables of states which are classified belonging to West and East coast

States classified as West coast and their corresponding two letter state codes

State code	State official name
CA	State of California(CA),
AK	Washington
HI	State of Hawaii
OR	Oregon
WA	Alaska

States classified as East coast and their corresponding two letter state codes

State code	State official name	State code	State official name
NJ	New Jersey	NH	New Hampshire
CT	Connecticut	NY	New York
DC	Washington D.C	PA	Pennsylvania
DE	Delaware	PR	Puerto Rico
FL	Florida	RI	Rhode Island
GA	Georgia	SC	South Carolina
MA	Massachusetts	VA	Virginia
MD	Maryland	VI	Virgin Islands
ME	Maine	VT	Vermont
NC	North Carolina		

Appendix C

Appendix C table reports the estimated coefficients (Coef.), standard errors(Std.er.) and corresponding T-statistics(t) together with p-values(p) for Hypothesis 2 in a case of only including firms with headquarters in the United States. In the table Treatpost(TP) is the dummy variable indicating the observed treatment affection. Logsize is the control variable which is natural logarithm from one day lagged firm size. Treat and post dummies are omitted due to collinearity with fixed effects and thus excluded from the table. In the tables lower section is reported usage of Firm and date fixed effects, Models R-square and adjusted R-square together with number of observations. Signs * (10%), ** (5%) and *** (1%) refers to the most common statistical significance levels

	Patriotic only us +/-3 days			Patriotic only us +/-5 days			Patriotic only us +/-10 days			Patriotic only us +/-20 days		
	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)	Coef.	Std. Err.	T (p>T)
treateffect	-0.00004	0.00068	-0.06 (0.951)	-0.00004	0.00049	-0.08 (0.938)	-0.000129	0.00050	-0.26 (0.795)	-0.00032	0.00043	-0.75 (0.452)
logs	-0.00504	0.00114	-4.40 (0.000***)	-0.00498	0.00078	-6.32 (0.000***)	-0.004895	0.00059	-8.37 (0.000***)	-0.00618	0.00074	-8.32 (0.000***)
Firmfixed effect	yes			yes			yes			yes		
Date fixed effect	yes			yes			yes			yes		
R-squared	0.1114			0.1008			0.0976			0.0855		
Adj R-squared	0.0680			0.0709			0.0786			0.0722		
Number of obs	34 872			52 693			84,125			129 259		